

# Evaluate the Effectiveness of a Planned Teaching Programme on Knowledge Regarding Iron Deficiency Anemia among Adolescent Girls

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## Abstract

Iron deficiency anemia continues to be a serious public health issue, especially for adolescent girls in poor nations like India. Its great incidence is sometimes ascribed to a lack of knowledge about its causes, symptoms, management, and prevention. The purpose of this study was to assess the impact of a planned teaching programme on knowledge regarding iron deficiency anemia among adolescent girls at Government Girls Higher Secondary School in Ranibagh, Anantnag, Jammu & Kashmir. The study employed a quantitative pre-experimental one-group pre-test post-test design. Simple random selection was used to choose 31 adolescent girls. A self-structured questionnaire was used to gather data both before and after the proposed teaching program was put into action. Both descriptive and inferential statistics were used in the analysis. The results showed a notable improvement. The results showed that knowledge improved considerably after the planned teaching programme was carried out. Only 6.45% of the study participants had adequate knowledge, 16.13% had inadequate knowledge, and 77.42% had moderate knowledge in the pre-test. In the post-test, none had inadequate knowledge, 3.23% had moderate knowledge, and 96.77% had adequate knowledge.  $15.06 \pm 4.024$  was the mean pre-test score, while  $24.58 \pm 1.911$  was the mean post-test score. A significant difference in knowledge levels was indicated by the calculated *t*-value of 1.89 and *p*-value of 0.000. The study found that the knowledge of adolescent girls about iron deficiency anemia was improved by the planned teaching programme.

**Keywords:** Adolescent Girls, Iron Deficiency Anemia, Knowledge, Planned Teaching Programme

## 1. Introduction

A lack of red blood cells or haemoglobin, which is essential for the transportation of oxygen, results in anemia. Anemia symptoms result from this condition's inadequate oxygen flow to tissues [1]. Adolescence, which is defined as the years between 10 and 19, is a crucial time for both psychological and physical changes. It is the time when nutritional anemia is most common, affecting growth and cognitive function, but it is frequently disregarded in public health initiatives [2]. Despite the present focus on newborns and young children, as well as pregnant and breastfeeding mothers, treating anemia during adolescence is crucial for general health [3].

In many underdeveloped countries, anemia, especially iron deficiency anemia, is a serious health problem that causes maternal and Fetal fatalities [4]. Due to widespread malnutrition, South Asia has significant anemic rates [5]. Adolescents between the

ages of 10 and 19 comprise a significant portion of the population, particularly in low- and middle-income nations like Ethiopia, where they account for almost half of the total [6]. During this time, a significant amount of bone development takes place, making it an important time for growth. High nutritional intake is necessary during adolescence, particularly for iron. Low haemoglobin levels, which are indicative of anemia, present serious health hazards, especially in low-source environments. The main cause of anemia worldwide is iron deficiency, which primarily affects Asia and Africa and causes small red blood cells and low haemoglobin [7].

Based on haemoglobin levels, the WHO classifies anemia into several severity levels [3]. Adolescent girls in some areas, like South West Asia and sub-Saharan Africa, have high prevalence rates [8]. Anemia is a moderate public health concern among school-age girls in Ethiopia, according to local studies [9]. Anemia is still very common among women in the reproductive

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age range, despite international health initiatives. Certain areas of Ethiopia have high incidence of anemia among women who are not pregnant. Anemia in adolescent girls is caused by a number of factors, such as food, socioeconomic position, and health-related behaviours. Menstruation and pregnancy raise the risk of anemia throughout adolescence, highlighting the significance of sufficient iron consumption and public health initiatives [10]. Anemia not only hampers the physical growth of adolescent girls but also impairs their educational achievements and labor productivity. Research has demonstrated its adverse effects on cognitive function, mental health, school attendance, learning, academic achievements, and work performance. Anemia increases the likelihood of delivery difficulties and low birth weight babies in pregnant teenagers, which affects not only the adolescent girls now but also the development of society in the future [11].

According to the WHO, anemia affects 269 million children aged 6 to 59 months and half a billion women aged 15 to 49 worldwide. Anemia affected 37% (32 million) of pregnant women and 30% (539 million) of non-pregnant women between the ages of 15 and 49 in 2019. Anemia is thought to afflict 40% of all children aged 6-59 months, 37% of pregnant women, and 30% of women aged 15-49 worldwide [1]. According to the Ministry of Health and Family Welfare, India, the National Family Health Survey-5 (2019–21) found that the incidence of anemia in six groups was 25.0% among men (15–49 years) and 57.0% among women (15–49 years), 52.2% among pregnant women (15–49 years), 67.1% among children (6–59 months), 31.1% among adolescent boys (15–19 years), and 59.1% among adolescent girls (15–19 years) [13].

**Muhealdeen HE, Aziz AR (2022)** conducted a pre-experimental study using a one-group pre-test and post-test design in secondary schools located in Kirkuk City, Iraq, between April 11 and December 27, 2022 [13]. The study included 62 adolescent girls selected through a non-probability purposive sampling method. According to pre-test results, 59.7% of the adolescent girls had poor eating habits and 54.8% had mild iron deficiency anemia. After participating in a nutrition education program, post-test results indicated that 66.1% of the adolescent girls adopted healthy eating practices and 53.2% showed normal iron levels. The study came to the conclusion that providing structured nutrition education is a useful and long-term method to enhance both nutritional status and knowledge about anemia among adolescent girls.

**Chandra kumari A. S. et al. (2019)** carried out a cross-sectional study to determine the prevalence of anemia among 255 adolescent girls in Puducherry, India [14]. The findings showed that 48.63% (n = 124) of the adolescent girls were anemic, and among them, 55.24% (n = 69) had mild anemia. It was further observed that 188 (73.73%) of the adolescent girls were in the early adolescent age group of 10–14 years. However, the prevalence of anemia was higher (52.24%) among late adolescent girls and those belonging to low socioeconomic status. The study indicates a substantial burden of anemia among adolescent girls, particularly among late adolescents and those from economically disadvantaged backgrounds, underscoring the need for focused interventions to

address anemia in this high-risk population.

**Bashir R & Khan N (2013)** carried out a cross-sectional study to determine the prevalence of anemia among 255 adolescent girls in Puducherry, India. The findings showed that 48.63% (n = 124) of the adolescent girls were anemic, and among them, 55.24% (n = 69) had mild anemia [15]. It was further observed that 188 (73.73%) of the adolescent girls were in the early adolescent age group of 10–14 years. However, the prevalence of anemia was higher (52.24%) among late adolescent girls and those belonging to low socioeconomic status. The study indicated a substantial burden of anemia among adolescent girls, particularly among late adolescents and those from economically disadvantaged backgrounds, underscoring the need for focused interventions to address anemia in this high-risk population.

So, considering the above facts, the researchers wanted to carry out a research study "to evaluate the effectiveness of a planned teaching programme on knowledge regarding iron deficiency anemia among adolescent girls" to gain adequate, accurate, and more information as well as a suitable guideline for the further development of health education strategies. This is one of the best ways to improve the nutritional status and prevent iron deficiency anemia among adolescent girls. Studies have indicated that iron deficiency anemia most commonly affects adolescent girls, largely due to poor nutritional intake, menstruation, and accelerated growth in this age group, which tends to be overlooked. Providing timely health education to adolescent girls in schools can encourage better dietary choices and help prevent anemia.

That is why Government Girls Higher Secondary School, Ranibagh, Anantnag was selected as the study setting, as it offered an appropriate environment to reach adolescent girls, deliver health education on iron deficiency anemia, correct false beliefs, and encourage healthy practices. Therefore, the researchers designed the present study to assess the knowledge of adolescent girls regarding iron deficiency anemia before and after administering a planned teaching programme.

### 1.1 Objectives of the Study

1. To assess the knowledge regarding iron deficiency anemia among adolescent girls before the implementation of the planned teaching programme
2. To assess the knowledge regarding iron deficiency anemia among adolescent girls after the implementation of the planned teaching programme.
3. To compare the knowledge scores regarding iron deficiency anemia among adolescent girls before and after the implementation of the planned teaching programme.

### 1.2 Research Hypothesis

- $H_1$ : - There is a significant difference between mean pre-test and post-test knowledge scores regarding iron deficiency anemia among adolescent girls at 0.05 level of significance.
- $H_0$ : -There is no significant difference between mean pre-test and post-test knowledge scores regarding iron deficiency anemia among adolescent girls with level of significance 0.05.

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## 2. Literature Review

❖ **Najma et al. (2024)** conducted a pre-experimental one-group pre-test post-test study among 30 adolescent girls at Spring Buds School, Ompura Budgam, Jammu and Kashmir, to determine the effectiveness of a structured teaching programme on anemia prevention [16]. The pre-test findings showed that 93.3% of the adolescents had below-average knowledge and only 6.7% had average knowledge. After the teaching programme, 86.7% had good knowledge and 13.3% had average knowledge, with none falling in the below-average category. The researchers concluded that the structured teaching programme markedly improved knowledge related to anemia prevention.

❖ **Rahman A, Ul Erum A, Yousuf AW (2023)** carried out a cross-sectional study among 240 school-going adolescent girls aged 12–18 years in government and private schools of Srinagar, Jammu and Kashmir, to assess the prevalence of iron deficiency anemia [17]. The study revealed that 25% of the girls were anemic, including 11.25% with iron deficiency anemia, 8.75% with nutritional anemia, and 5% with anemia of chronic disease. Inadequate dietary practices (63.75%), menstrual losses, and lack of awareness about iron-rich foods were identified as contributing factors. The researchers recommended nutrition-based education, iron supplementation, and regular school-level screening to reduce anemia.

❖ **Pandey S. (2023)** implemented a pre-experimental one-group pre-test post-test study among 100 adolescent girls of Swami Dayananda Saraswati Inter College, Ayodhya, Uttar Pradesh, to evaluate the effectiveness of a structured teaching programme regarding iron deficiency anemia [18]. Before the intervention, 75% of the girls had good knowledge and 25% had poor knowledge. After the teaching programme, 95% of the participants attained excellent knowledge and 5% had good knowledge. The study concluded that the structured teaching programme substantially improved knowledge about iron deficiency anemia among adolescent girls.

❖ **Subramaniam M, et al. (2022)** conducted a community-based cross-sectional study among 272 adolescent girls who had attained menarche in 28 villages of Ballabgarh Block, Faridabad, Haryana [19]. Haemoglobin estimation indicated that 71.7% of the girls were anemic, with 4.8% having severe anemia, 41.2% moderate anemia, and 25.7% mild anemia. Maternal education showed a significant association with anemia status, with higher maternal literacy having a protective effect. The researchers emphasized that anemia remains a major public health concern in rural Haryana and highlighted the need for focused interventions.

❖ **Anto A et al. (2022)** carried out a pre-experimental one-group pre-test post-test study among 40 adolescent girls at Marthoma Girls Higher Secondary School, Thrissur, Kerala, to assess the effectiveness of a structured teaching programme on iron deficiency anemia and its prevention [20]. During the pre-test, 95% of the girls had inadequate knowledge and 5% had moderate knowledge. After the intervention, 57.5% adolescent girls were having inadequate knowledge and 42.5% were having moderate knowledge. Although adequate knowledge was not achieved, the increase in mean scores suggested that the teaching programme had a positive influence on improving knowledge.

❖ **Kaparwan M. (2021)** conducted a pre-experimental study among 300 adolescent girls at Government Girls School, Kalalghati, Kotdwar, Uttarakhand, to evaluate a structured teaching module on the prevention of anemia [21]. The pre-test revealed that 61.3% had inadequate knowledge, 33.63% had moderate knowledge, and only 5% had adequate knowledge. Post-test results showed that 90.63% of the girls were having adequate knowledge, 9.3% were having moderate knowledge, and only 0.3% were having inadequate knowledge. The study highlighted significant associations between knowledge levels and socioeconomic as well as parental educational status.

❖ **Gayakwad VS, Shankar G. (2019)** conducted a community-based cross-sectional study among 400 unmarried adolescent girls aged 10–19 years in the urban field practice area of S. Nijalingappa Medical College, Bagalkot, Karnataka [22]. The overall prevalence of anemia was 63.3%, with 23.3% having mild anemia, 38.2% moderate anemia, and 1.8% severe anemia. Factors such as age, maternal literacy, socioeconomic status, family type, sanitation, and tea consumption were significantly associated with anemia. The authors recommended health education, periodic haemoglobin screening, and iron supplementation to reduce anemia prevalence.

❖ **Meena S, and Yashaswinideepak M (2018)** carried out a quasi-experimental one-group pre-test post-test study among 140 adolescent girls at Guru Nanak Senior Secondary School, Udaipur, Rajasthan, to assess the effectiveness of a structured teaching programme regarding iron deficiency anemia [23]. Pre-test findings showed that 27.85% had inadequate knowledge and 72.15% had moderate knowledge. After the intervention, 29.29% adolescent girls were having adequate knowledge while 70.71% were having moderate knowledge. The notable rise in mean post-test scores indicated that the structured teaching programme contributed to improved knowledge.

❖ **Ahwal S (2016)** conducted a cross-sectional study among 100 adolescent girls aged 15–19 years at Rufaida College of Nursing, New Delhi, to assess their knowledge and prevalence of iron deficiency anemia [24]. The findings revealed that 70% of the girls were anemic, with haemoglobin levels below 12 g/dl. The study emphasized that increased awareness through educational interventions could help improve knowledge levels and contribute to reducing the prevalence of iron deficiency anemia in this age group.

❖ **Biradar SS, Biradar SP, Alalagi AC, Wantamutte AS, and Malur PR (2012)** conducted a one-year cross-sectional study among 840 adolescent girls aged 10–19 years in rural areas associated with Vantamuri Primary Health Centre, under J.N. Medical College, Belgaum, Karnataka [25]. The study identified that 41.1% of the girls were anemic, comprising 34.6% with mild anemia, 6.3% with moderate anemia, and 0.6% with severe anemia. Higher prevalence was noted among late adolescents (15–19 years). Low socioeconomic status showed a significant association with anemia. The study highlighted the need for dietary improvement, iron supplementation, and socioeconomic upliftment to address anemia effectively.

### 3. Materials and Methods

A pre-experimental research approach with a single group pre-test–post-test design was used for the present study. Data collection was carried out from **9 November 2024 to 15 November 2024**. Initially, a self-developed knowledge questionnaire was administered to evaluate baseline knowledge of adolescent girls regarding iron deficiency anemia. After completing the pre-test, a planned teaching programme on iron deficiency anemia was delivered. The same questionnaire was then used to reassess the knowledge of participants in the post-test phase.

The study sample consisted of 31 adolescent girls enrolled at Government Girls Higher Secondary School, Ranibagh, Anantnag, Jammu and Kashmir, India. Selection of participants was done through simple random sampling. Ethical approval for the study was secured from the Institutional Ethical Committee (IEC), GMC Anantnag. Additional permission to conduct the study was obtained from the Principal of the Higher Secondary School where this research was carried out. Written informed consent was taken from the parents/guardians of all participants, and confidentiality of the information provided was maintained throughout the study period.

Eligibility criteria included adolescent girls aged **13–18 years**, available during data collection, and willing to take part in the study. Data were gathered using a structured questionnaire specifically prepared for this research. The tool consisted of two major parts:

- **Section A:** Demographic information such as age, religion, family structure, type of residence, monthly household income, age at menarche, menstrual duration, previous awareness about anemia, and source of prior information.
- **Section B:** Items assessing knowledge related to iron deficiency anemia covering definition, etiology, signs and symptoms, complications, preventive measures, treatment approaches, and iron-rich dietary sources.

Each correct response on the knowledge questionnaire received a score of one, while an incorrect response received zero. Participants completed the form independently. Reliability of the questionnaire was evaluated using Karl Pearson’s correlation coefficient, yielding a coefficient value of  $r = 0.670$ , indicating acceptable reliability. Content validity was ensured through review by subject experts

in Obstetric and Gynaecological nursing and medical education.

Data analysis was performed with assistance of a statistician. Frequency and percentage were utilized to summarize demographic characteristics and overall knowledge levels. Descriptive statistics including mean and standard deviation were applied to compare pre-test and post-test scores. The paired t-test was employed to determine statistical significance of differences between the mean knowledge scores before and after the structured teaching programme, and appropriate interpretations were made.

### 4. Results and Discussion

**The findings of the study are discussed under these sub-headings:**

#### 4.1 Demographic Findings of the Study Group

A total of 31 adolescent girls took part in the study. Most of them (87.1%) were 15–16 years old while 6.5% each were 13–14 years old and 17–18 years old. All respondents were Muslims.

The majority of participants (77.4%) belonged to urban areas, followed by 19.4% who belonged to rural areas and 3.2% who belonged to semi-urban areas. Nearly half of the participants (48.4%) belonged to joint families, 38.7% belonged to nuclear families, 9.7% belonged to single-parent families, and 3.2% belonged to extended family arrangements. Regarding monthly family income, 64.5% belonged to households earning less than ₹10,000 per month. A small proportion (3.2%) belonged to households with a monthly income of ₹20,000–₹40,000, 22.6% belonged to the ₹50,000–₹80,000 income group, and 9.7% belonged to households earning more than ₹80,000. Most respondents (90.3%) lived in their own houses, while 3.2% lived in rented houses and 6.5% lived in other types of residences.

Menstrual history showed that 67.7% attained menarche at 13–14 years of age, 29.0% attained menarche at 15–16 years, and 3.2% attained menarche at 17–18 years. More than half of the participants (54.8%) reported a menstrual duration of 3–5 days, 35.5% reported a duration of 5–7 days, 6.5% reported a duration of more than 7 days, and 3.2% reported a duration of 0–3 days. Only 25.8% of the respondents had heard about anemia prior to the study, whereas 74.2% had no previous knowledge. Among those who were already aware, 32.3% received information from family members, 25.8% from mass media, 19.4% from friends, and 22.6% from other sources. **(Table 1)**

Variables	Categories	n	(%)
Age (Years)	13-14	2	6.5%
	<b>15-16</b>	<b>27</b>	<b>87.1%</b>
	17-18	2	6.5%
Religion	<b>Muslim</b>	<b>31</b>	<b>100%</b>
	Non-Muslim	0	0.0%
Living Status	<b>Urban</b>	<b>24</b>	<b>77.4%</b>
	Rural	6	19.4%
	Semi-Urban	1	3.2%

Family Type	Joint	15	48.4%
	<b>Nuclear</b>	<b>12</b>	<b>38.7%</b>
	Single Parent	3	9.7%
	Extended	1	3.2%
Monthly Income of Family	<b>&lt;10,000</b>	<b>20</b>	<b>64.5%</b>
	20,000-40,000	1	3.2%
	50,000-80,000	7	22.6%
	>80,000	3	9.7%
Type of Residence	<b>Own Home</b>	<b>28</b>	<b>90.3%</b>
	Rented Home	1	3.2%
	Hostel	0	0.0%
	Others	2	6.5%
Age at Menarche (Years)	<b>13-14</b>	<b>21</b>	<b>67.7%</b>
	15-16	9	29.0%
	17-18	1	3.2%
Duration of Menstruation (Days)	0-3	1	3.2%
	<b>3-5</b>	<b>17</b>	<b>54.8%</b>
	5-7	11	35.5%
	>7	2	6.5%
Previous Knowledge on Anemia	Yes	8	25.8%
	No	23	74.2%
Source of Prior Information	<b>Family</b>	<b>10</b>	<b>32.3%</b>
	Mass Media	8	25.8%
	Friends	6	19.4%
	Others	7	22.6%

**Table 1: Distribution of Participants According to Selected Socio-Demographic Variables (n = 31)**

**Knowledge score of study subjects regarding iron deficiency anemia in pre-test and post-test.** An assessment of knowledge levels before and after the planned teaching programme showed a clear shift in the distribution of scores. In the pre-test, out of the 31 participants, 16.13% (n = 5) had inadequate knowledge, 77.42% (n = 24) had moderate knowledge, and 6.45% (n = 2) had adequate knowledge prior to the intervention.

Following the planned teaching programme, the post-test results

showed a marked improvement. A large majority, 96.77% (n = 30), had adequate knowledge, 3.23% (n = 1) had moderate knowledge, and none of the participants had inadequate knowledge in the post-test.

This shift from predominantly inadequate or moderate knowledge in the pre-test to predominantly adequate knowledge in the post-test indicates that the planned teaching programme was effective in improving awareness and understanding regarding iron deficiency anemia among the study subjects. (Table 2).

Knowledge Level	Pre-Test (N=31)	Post-Test (N=31)
Inadequate Knowledge	5 (16.13%)	0 (0.00%)
Moderate Knowledge	<b>24 (77.42%)</b>	1 (3.23%)
Adequate Knowledge	2 (6.45%)	30 (96.77%)

**Table 2: Knowledge Levels of Study Subjects Regarding Iron Deficiency Anemia in Pre-test and Post-Test**

#### 4.2 Comparison of Pre-test and Post-test Knowledge Scores.

A comparison of the mean knowledge scores before and after the planned teaching programme showed considerable improvement among the study subjects. The mean knowledge score in the

pre-test was  $15.06 \pm 4.024$ , whereas the mean post-test score increased to  $24.58 \pm 1.911$ . The calculated mean difference was 9.52, indicating a marked rise in knowledge levels following the intervention.

The statistical analysis using the paired t-test revealed a t-value of 1.89 with a corresponding p-value of 0.000. Since the p-value was less than the 0.05 level of significance, the difference between the pre-test and post-test mean scores was statistically significant. This indicates that the improvement in knowledge regarding iron deficiency anemia among adolescent girls was attributable to the planned teaching programme.

Based on these findings, the null hypothesis ( $H_0$ ), which stated that there would be no significant difference between the pre-test and post-test knowledge scores, was rejected. Accordingly, the research hypothesis ( $H_1$ ) was accepted, confirming that the structured teaching programme led to a significant increase in post-test knowledge scores among the study subjects (Table 3).

Assessment Phase	Mean Score ( $\pm$ SD)	Difference Between Means	t-value	p-value	Inference
Before intervention (Pre-test)	15.06 $\pm$ 4.024	9.52	1.89	0.000	Statistically Significant Improvement
After intervention (Post-test)	24.58 $\pm$ 1.911				

**Table 3: Comparison of Pre-test and Post-test Knowledge Scores**

### 5. Conclusion

The findings of the study emphasized the effectiveness of a structured teaching programme in enhancing knowledge about iron deficiency anemia among adolescent girls. Statistical analysis demonstrated a significant improvement in the mean post-test knowledge scores following the implementation of the planned teaching programme. The frequency distribution of post-test scores revealed that 96.77% of the participants had adequate knowledge, 3.23% had moderate knowledge, and none had inadequate knowledge regarding iron deficiency anemia. These results indicated that the baseline knowledge of adolescent girls at Government Girls Higher Secondary School, Ranibagh, Anantnag, had been initially low but improved substantially after the structured teaching intervention. The study thus confirmed that the planned teaching programme was effective, appropriate, and feasible in improving knowledge. Furthermore, the participants perceived the programme as beneficial and relevant, which enhanced their understanding and awareness of iron deficiency anemia.

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